

## ABSTRACT OF THE DISCLOSURE

A vehicle driven by a homogeneous-charge compression ignition (HCCI) engine includes a fuel supply that supplies a hydrocarbon fuel in a first amount and an acetylene supply that supplies an acetylene-based component in a second amount. A cylinder has a piston reciprocally driven therein. The cylinder receives a combustion mixture including a third amount of air, the first amount of hydrocarbon fuel and the second amount of the acetylene-based component. The piston compresses the combustion mixture to induce auto-ignition of the combustion mixture. The acetylene-based component includes one of acetylene, an acetylene-hydrogen mixture, and a mixture of acetylene, hydrogen and other products of the acetylene production process.